Chapter 2 Networks & Matrices

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Section 2.1 - Creating & Traveling Network Graphs

Curriculum Outcomes	Related Activities	Page in Text
• model real-world situations with networks and matrices	• introduction in representing networks with connected graphs • investigation on using graphs to solve network problems and to determine whether or not a graph can be traveled completely without repeating an edge	56

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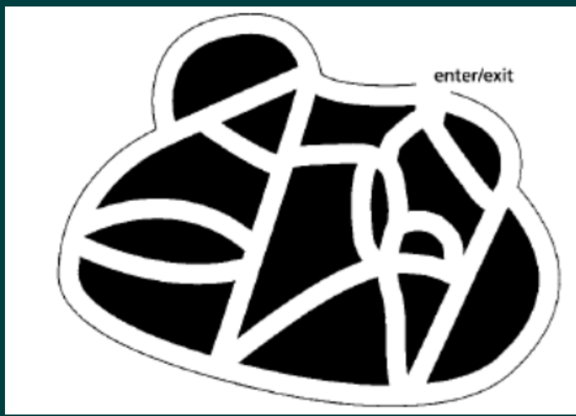
Network = A set of people, places, objects, or ideas that are connected in some way.

Examples: TV networks, workplaces, friends, messaging systems, mazes etc....

A-Mazign Challenge: you must travel every path of the maze exactly once. You are unable to go over a path a second time. Is it possible to go through the maze like this?



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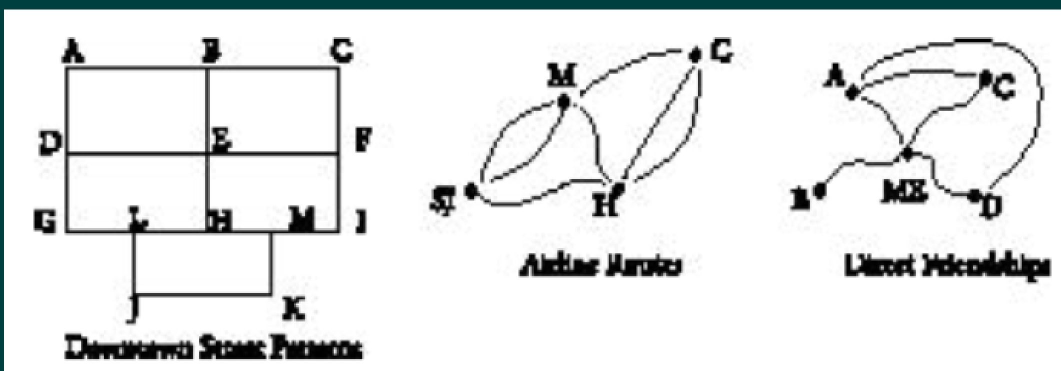
Network Graph = consists of a set of points called vertices connected by lines called edges.

Examples: mail delivery routs, hiking trails, garden landscaping, etc....



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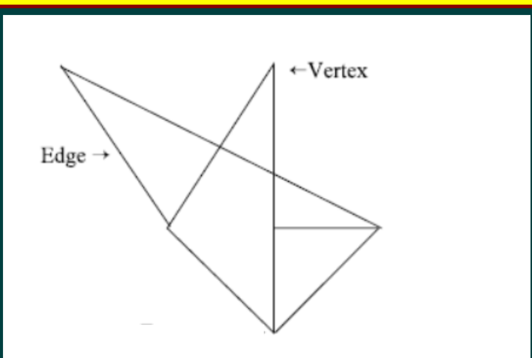
Network Graphs : Key Ideas

- made up of vertices and edges
- vertices represent items in the network
- edges represent connections between items
- graphs can be used to solve real-life problems



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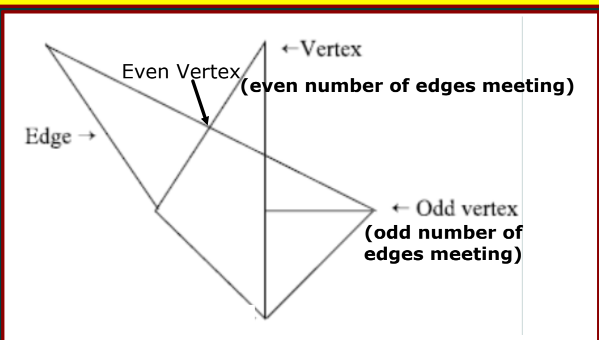
Rules for Working with Network Graphs:

- Network graphs with even vertices can be travelled completely by traveling each edge only once and starting and ending at the same vertex.
- Network graphs with exactly 2 odd vertices can also be travelled completely by traveling each edge once but by entering and exiting at different vertices.
- Network graphs with any other number of odd vertices cannot be traveled completely.



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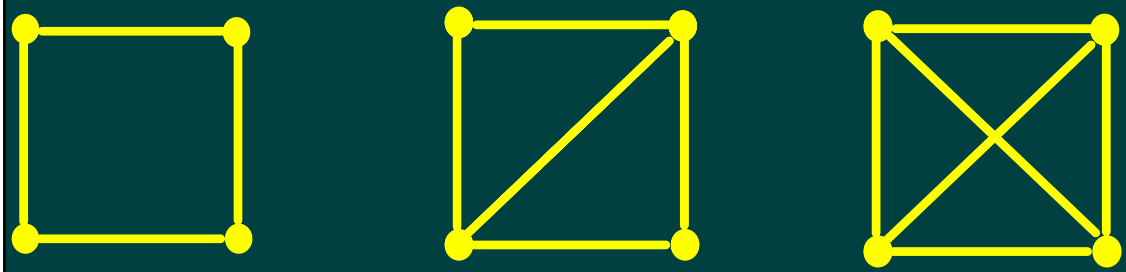
EXAMPLES:

Which of the following network graphs can be traveled without repeating an edge?



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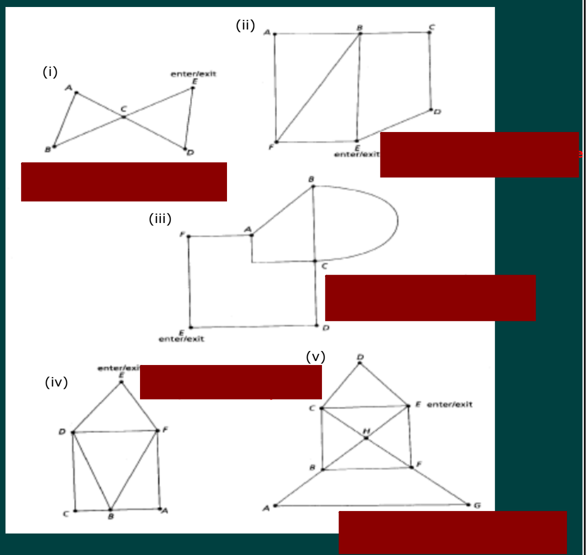
Investigation #1

Purpose: Mail carriers try to cover a network of roads traveling the minimum distance. That means finding a route that does not repeat any roads, if possible.

A. Each network graph represents roads for mail delivery. Which networks can be traveled without repeating a road? Record your route (Note: Assume that mail boxes are on one side of each road.)

Hint: Remember your rules for traveling networks without repeating edges.....



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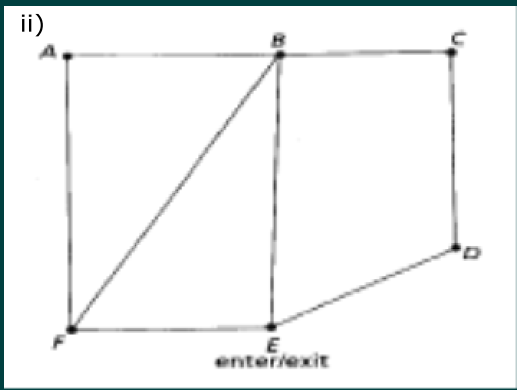
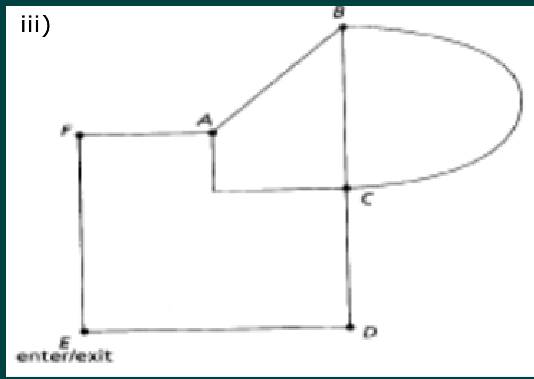
Investigation Questions:

1. a) Examine the networks that cannot be traveled without repeating a road. Add one edge to each graph so that a non-repeating route is possible. What do you notice?





b) In each of the network graphs in Step A, you entered and exited the network from the same place. Would it make any difference for some of the networks if they had a different entrance and exit?

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c) Create a network which:

i) can be travelled without repetition, entering and exiting at the same vertex

ii) can be travelled without repetition, entering and exiting at different vertices

iii) cannot be travelled without repetition.

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Practice:

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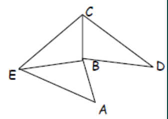
A) A garbage truck can collect garbage in one trip down each street. Describe its route for each of the networks below by naming the vertices of each graph in order.

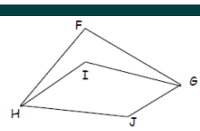
Graph A

Route → ___, ___, ___, ___
___, ___, ___, ___



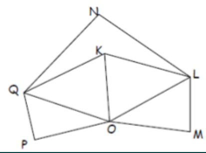
Graph B

Route → ___, ___, ___,
___, ___, ___, ___



Graph C

Route → ___, ___, ___, ___, ___, ___,
___, ___, ___, ___, ___, ___



B) For which networks can the garbage truck begin and end at the same intersection? →

C) Suppose the garbage truck needed to make two trips down each street. For which networks can the garbage truck begin and end at the same intersection? →

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Class work / Homework:

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